ERIC Document Resume	See Instruction Sheet	DATE OF RESUME	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED001218	N.A.	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
N.A.

5. TITLE OF DOCUMENT ABSTRACTED:
The Challenge: A Program for Gifted Children in the Eighth Grade

6. PUBLICATION TITLE:
N.A.

MICROFILM COPY AVAILABLE
YES ☐ NO ☐

COPYRIGHT GRANTED
YES ☐ NO ☒

COPYRIGHT RELEASE FILED
YES ☐ NO ☐

TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☐
FOLLOW-UP ☐

7. EDITOR(S):
Carter, C. Douglas

8. PLACE OF ORIGIN
ORG. Dept. of Education
ST. Western Carolina College
CITY Cullowhee, N.C.
TELE
INST/LOC CODE

9. PUBLISHER OR SOURCE
Department of Education, Western Carolina College, Cullowhee, North Carolina

OTHER ERIC REFERENCES:

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	N.A.	64

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
curriculum guide

16. INDEXING TERMS (6-12)

curriculum enrichment	resources		
skill development	junior high school	exceptionally talented	
learning abilities	gifted children	basic skills	

17. ABSTRACT (MAX. 250 WORDS)

Ideas included are the product of an intensive workshop held to study the public school education of exceptionally talented children.

A program was developed to meet the needs of the exceptionally talented student and to provide enrichment experiences for all children. Improvement is sought in the skills of abstract thinking, organization, judgment, creative writing, and ability to engage in group activities. A nucleus of purposeful planning is presented in outline form in each subject so that a teacher may broaden the scope of the required courses of study.

In hopes of equipping each student with skills necessary to face the problems of his generation nine problem areas of study are suggested: self-development, understanding my fellowman, choosing a vocation, duties as citizens, living together in our community, government, our economic system, our resources, and the study of our arts. Science and mathematical problem areas for enrichment conclude the guide.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

ED001218

TD 2

The Challenge . . .

REPRINTED BY PERMISSION
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN PRINTED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

A PROGRAM
for
GIFTED CHILDREN
in the
EIGHTH GRADE

The Challenge

The general objects - - - are to provide an education adapted to the years, to the capacity, and the condition of everyone, and directed to their freedom and happiness - - - We hope to avail the state of those talents which nature has sown as liberally among the poor as the rich, but which perish without use, if not sought for and cultivated.

- Thomas Jefferson,
Notes on Virginia

THE CHALLENGE . . .

A PROGRAM FOR GIFTED CHILDREN

C. DOUGLAS CARTER

EDITOR

FIELD DIRECTOR OF THE COMMISSION TO STUDY THE PUBLIC

SCHOOL EDUCATION OF EXCEPTIONALLY

TALENTED CHILDREN OF THE STATE OF NORTH CAROLINA

AND

DIRECTOR OF SPECIAL SERVICES

WINSTON-SALEM CITY SCHOOLS

WINSTON-SALEM, NORTH CAROLINA

FOREWORD

This guide is the consummation of an intensive workshop held at Western Carolina College sponsored by the North Carolina Commission to Study the Public School Education of Exceptionally Talented Children.

Gratitude is expressed to the following dedicated teachers, principals, and supervisors for their painstaking and intelligent devotion in the preparation of these guides.

Aycock, Lucille F.
Babb, Clara C.
Broome, Ethel Park
Broome, H. S.
Clark, Eva M.
Cross, E. Martin
Ellett, Elizabeth W.
Freeman, Mae Morton
Freeman, Ottis C.
Gray, Mary Lee
Hawkins, James
Helms, Kate L.
Henries, Gladys
Isaacs, Edith B.
Leslie, Mary Ann
Martin, Louvenia P.
Morrison, Janie
Mullen, Ted
Myers, Roy Lee
Peele, Anna B.
Plyler, Annette P.
Presson, Helen James
Scott, John J.
Skokan, Olga E.
Strickland, Thomas L.
Weant, Agnes Pugh
Wells, Mamie Perry
Williams, Maude T.

GRATITUDE IS EXPRESSED TO

C. D. KILLIAN

CHAIRMAN OF THE COMMISSION TO STUDY THE PUBLIC
SCHOOL EDUCATION OF EXCEPTIONALLY
TALENTED CHILDREN OF THE STATE OF NORTH CAROLINA
AND
HEAD OF DEPARTMENT OF EDUCATION AND PSYCHOLOGY
WESTERN CAROLINA COLLEGE
CULLOWHEE, NORTH CAROLINA

H. H. BIXLER

RESEARCH DIRECTOR OF THE COMMISSION TO STUDY THE PUBLIC
SCHOOL EDUCATION OF EXCEPTIONALLY
TALENTED CHILDREN OF THE STATE OF NORTH CAROLINA
AND
PROFESSOR OF EDUCATION
WESTERN CAROLINA COLLEGE
CULLOWHEE, NORTH CAROLINA

FOR THEIR HELPFUL ADVICE AND COUNSEL IN THE
PREPARATION OF THIS MANUAL

TO THE TEACHER

This guide represents the cooperative efforts of the teachers of North Carolina who were chosen by the Commission to Study the Public School Education of the Exceptionally Talented and by the State of North Carolina and to develop an enrichment program that will not only meet the needs of the exceptionally talented, but will be helpful in providing an enrichment program for all children, since "the keynote to all good teaching is enrichment."

From such a program, we believe will come facility in the skills of abstract thinking, organization, discriminating judgment, creative writing and the ability to engage profitably, and purposefully, in group activity; hence, enrichment will result.

The planners further think that enrichment will accrue, only to the extent that children learn the essential skills and that subject matter becomes meaningful and purposeful to the learner.

It is also our belief, that if these activities are carefully and intelligently followed, that beyond the development of skills, there will be a depth of understanding which will result in critical and conceptual thinking on the part of the learner.

This outline represents a nucleus of purposeful planning, whereby, the resourceful teacher may broaden the scope and implement a program that is more extensive than that of the course of study as outlined by the Department of Public Instruction in the State of North Carolina and will add depth and breadth to the teaching program.

THIS WE BELIEVE

The highly developed and complex society in which we live compels the educational program to develop skills in identifying, analyzing, and solving problems that are placed before the student in our schools today. In order for a student to live a happy, useful, and successful life in this society, it is imperative that adequate educational experiences be provided to meet the needs of each individual. Each student must be equipped with the necessary skills to face the growing problems of his generation. Therefore, it is assumed that the problem solving technique is of great significance in today's school curriculum.

THIS WE NEED

It is the conclusion of this committee that the school in a democratic society has two major purposes: (1) to teach democracy and (2) to teach students how to think. It is also concluded that creative thinking occurs when the student is faced with solving problems in whidh he has great concern.

The problem-solving approach, therefore, is outlined to conform with the basic concepts of a democracy because it allows the student to apply his intelligence in reaching a solution to the problems.

The five major steps in problem-solving are:

1. Recognition of the problem.
2. Stating the problem.
3. Surveying the problem.
4. Arriving at conclusions (based upon all facts).
5. Planning for action (based upon the conclusions).

PLATE

SUGGESTED PROCEDURES FOR ENRICHMENT

Problem Area I - Self-Development.

A. Films.
B. Class discussions, group discussions, committee work, and individual research.
C. Resource people: Psychologists, ministers, social worker, musicians, and artists, etc.
D. Dramatizations of friendship situations, social problems, and emotional problems.
E. Sociometric studies of the class.
F. Themes, biographies, and autobiographies.
G. Reading of biographies of famous people.

Problem Area II - Understanding My Fellowman.

A. Formation of a class Who's Who.
B. Discovery of Family problems existing among class members.
C. Tour of educational institutions and industries.
D. Tour of state capital.
E. Diagram to show structure of government.
F. The use of current periodicals.
G. Survey and polls of student opinion.

Problem Area III - Choosing a Vocation.

A. Pupil-teacher planning for individual, committee, and class work.
B. Use of reference materials for committee and for individual reading.
C. Resource people from professions and industries, and field trips.
D. Drama activities, creative writing, panels, exhibits, and displays.
E. Analysis of occupations represented.

Problem Area IV - Our Duties As a Citizen.

A. Develop the program through pupil-teacher planning.
B. Use committee work, individual research, and general class discussions.
C. Have students evaluate themselves.
D. Use films, classroom visitors, and assembly programs.

Problem Area V - Living Together In Our Community.

A. Pupil-Teacher planning, individual, committee, and class work.
B. Resource speakers, field trips, and films.
C. Use of reference materials.

Problem Area VI - Government.

A. Committee and group work, visitations, speakers, and movies.
B. Study tax forms.
C. Obtain election information.
D. Obtain copies of constitutions.

Problem Area VII - Our Economic System.

A. Committee work, reports, and individual research.
B. Use films, charts, and pamphlets.
C. Study financial reports from several corporations or businesses.

Problem Area VIII - Our Resources.

A. Show films, filmstrips, and slides on related activities.
B. Committee work and reports.
C. Field trips.
D. Plan bulletin board displays of products of industry, food products, and sources of energy.

Problem Area IX - The Study of Our Arts.

A. Listen to various types of music.
B. Report on composers.
C. Examine prints of famous paintings, sculpture, and architecture.

THIS WE CAN DO

Contained in this outline are nine problem areas which are felt by this committee to be basic for all students. Realizing that other problems will arise, it is anticipated that each teacher will supplement this outline with additional problems from their respective community.

PROBLEM AREA I

SELF-DEVELOPMENT

A. Developing my personality.

1. Importance of personality.
2. Changing of my personality.
3. Achieving the ideal personality.
4. Accepting my personality as it is.
5. Personality changes during adolescence.
   a. Effects of the classroom on personality during adolescence.
   b. Effects of family relations on personality during adolescence.

B. My goals in life.

1. Specific goals.
2. Need for setting goals.
3. Proper planning.
4. Obstacles to overcome in setting my goals.

C. Influence of other people on my personality.

1. Relationship with my group in the classroom
2. Effects of appearance on personality.
3. Importance of being liked.
4. Importance of taking part in group activities.

PROBLEM AREA II

UNDERSTANDING MY FELLOWMAN

A. Understanding my classmates.

   1. Sharing experiences in the classroom.

   2. Co-operation in classroom projects.

   3. Respecting the contributions of others.

   4. Appreciating the individual differences and abilities of others.

B. Understanding my family.

   1. Socio-economic status of my parents.

   2. Effects of size of family.

   3. Effects of parents occupation.

   4. Do I have too much leisure time?

C. Understanding my community.

   1. Origin.

   2. Growth.

   3. Occupational opportunities offered.

D. Understanding my state.

   1. History.

   2. Economic development.

   3. Educational opportunities.

   4. Resources.

      a. natural.

      b. human.

E. Understanding our nation.

   1. Early history.

   2. Formation of a democracy.

   3. Growth and development of our country.

   4. Characteristics of great leaders of our country.

PROBLEM AREA III

CHOOSING A VOCATION

A. Importance of selecting a vocation.

1. Providing one's needs

a. For happiness.

b. For financial security.

2. Competition and mechanization in present age.

B. My potentialities.

1. Evaluating my interests.

2. Ambitions.

3. Meeting the physical requirements.

4. Putting forth the time and effort.

5. Meeting the economic requirements.

C. Preparing.

1. Genuine interest.

2. Educational.

3. Part-time employment.

4. Other preparations.

D. Choosing the right vocation.

1. Survey of:

a. Materials.

b. Requirements.

c. Opportunities.

d. Salaries.

e. Future benefits.

2. Gaining first hand information.

a. Observation.

b. Trips.

c. Resource people.

d. Part-time employment.

E. Types of vocations.

1. Science related.

2. Education.

3. Medical.

4. Business.

5. Law.

6. Government.

7. Others.

PROBLEM AREA IV

OUR DUTIES AS A CITIZEN

A. Fulfilling our duties as a citizen in a democracy.

1. Understanding the meaning of democracy.

2. Comparative government.

3. Appreciation for self-rule.

4. Learning to work together.

5. Understanding our rights set forth in the constitution.

6. Recognition of differences in ability.

B. Individual rights.

1. Classroom.

2. Community.

3. State.

4. National.

C. Individual responsibilities.

1. Examination of candidates for public office.

2. Constructive criticism of government.

3. Familiarity of procedures.

4. Voting.

D. Recognizing rights and responsibilities.

1. Becoming familiar with statues, by-laws, ordinances, laws, etc.

2. Examining public opinion poles.

3. Continued interest in our government.

E. Becoming familiar with outstanding leaders.

1. What makes them outstanding?

2. Their effects on our way of life.

F. Appreciation of citizenship.

1. Acquiring citizenship.

a. Naturalization.

b. Immigration.

2. Advantages of citizenship.

a. Right to vote as we please.

b. Freedom of speech, press, etc.

PROBLEM AREA V

LIVING TOGETHER IN OUR COMMUNITY

A. History of community.

1. The settlement.

a. Early settlers.

b. Early leaders.

2. Growth and development.

a. Physical.

b. Political

c. Industrial

d. Social.

e. Educational.

B. Geographical features.

1. Location.

2. Area.

3. Population.

C. Government.

1. Structure.

2. Services.

a. Police.

b. Fire protection.

c. Water supply.

d. Medical facilities.

e. Sanitation.

f. Others.

3. Finances.

a. Taxes.

b. Fines and charges.

c. Budgeting.

d. Laws.

4. Comparative community government.

5. Responsibilities to our community government.

a. To obey the laws.

b. To vote.

c. To pay taxes.

d. To accept leadership responsibilities.

D. Industries.

1. Types.

2. Products of the industries.

3. Influence of industries on:

a. Transportation.

b. Education

c. Business.

d. Community leadership.

E. Educational facilities.

1. Secular education.

a. Public schools.

b. Private schools.

2. Religious education.

3. Denominational colleges. (If any).

4. Parochial schools. (If any).

PROBLEM AREA VI

GOVERNMENT

A. State Government.

1. Constitution. (framework)

2. Branches.

a. Executive.

b. Legislative.

c. Judiciary.

3. Current officials.

4. Services.

a. Public education.

b. Highway Patrol.

c. Highways.

d. Conservation.

(1) Natural resources.

(2) Wildlife.

e. Health and welfare.

f. National Guard.

g. State parks.

h. Others.

5. Finance

    a. Taxes

        (1) Income taxes. (2) Gasoline Taxes

    b. Budgeting.

6. Responsibilities.

    a. To obey the laws.

    b. To vote.

    c. To pay taxes.

    d. To accept leadership responsibilities.

7. Parties.

    a. Democratic.

    b. Republican.

8. Elections.

    a. Primaries.

    b. General election.

    9. Requirements for holding office.

        a. Governor.

        b. General assembly.

        c. Others.

B. National Government.

    1. Constitution. (framework)

    2. Branches.

        a. Executive.

        b. Legislative.

        c. Judiciary.

    3. Amendments.

    4. Services.

        a. Defense.

(1) Army

(2) Navy

(3) Air Force.

(4) Others.

b. Postal Service.

c. Social Security.

d. Veteran's benefits.

e. Agriculture.

f. Others.

5. How are these services financed?

a. Taxes.

b. Exports, imports, and tariffs.

c. Others.

6. National elections.

a. Types.

b. Qualifications of voters.

c. Political parties.

d. Party conventions.

e. Finances of compaigns.

f. Electoral vote.

g. Primaries.

7. Comparative government.

a. Democracy.

b. Communist.

c. Dictatorship.

d. Fascist.

8. Which countries influenced our present form of government.

a. England?

b. Rome?

c. Greece?

d. Others?

PROBLEM AREA VII

OUR ECONOMIC SYSTEM

A. Economic concepts.

1. Types of economics.

a. Price and private enterprise.

b. Institutional and welfare economics.

c. Planning and socialistic economics.

2. Traditional terms in economics.

a. Utility.

b. Useful goods and services.

c. Wealth. (various definitions).

d. Production

e. Consumption.

f. Income and its distribution.

g. Value.

h. Price

B. Development of economic organizations.

1. Prior to the Industrial Revolution.

a. Merchant guilds.

b. Craft guilds.

c. The Medieval Fair.

d. Nationalism.

e. Mercantilism.

f. Laissez Faire.

2. The English Industrial Revolution.

a. Origin.

b. Factories.

c. Laborers.

d. Transportation.

3. Effects of the Industrial Revolution.

a. Production.

b. Labor and capital.

c. Political control.

d. Urban problems.

C. Forms of business organizations.

1. Individual proprietorship.

2. Partnership.

3. Corporation.

a. The charter and state laws.

b. Separate legal rights of a person.

c. Activities.

d. Capital.

4. Financial structure of corporation.

a. Common stock.

b. Nature of preferred stock.

c. Bonds and notes.

d. The balance sheet.

5. Co-operatives.

6. Government corporations.

D. United States Monetary System.

1. Monetary unit.

2. Monetary standards.

3. Gold exchange standard.

4. Silver standard.

5. Paper standard.

E. Government control.

1. Nature of monopolistic power.

a. Reasons for growth of monopoly.

b. Advantages of large-scale production.

2. Antitrust legislation.

a. State laws.

b. The Federal Trade Commission.

3. Effects of war on monopolies.

F. Public utilities.

1. Nature.

2. Characteristics.

3. Public utility regulations.

4. Public ownership of utilities.

PROBLEM AREA VIII

OUR RESOURCES

A. Population.

1. Census.

a. How taken.

b. Importance of.

2. Utilities.

a. Natural.

b. Human.

1. Electrical.

2. Water and sewage.

B. Population and Industry.

1. Salaries.

2. Labor.

a. Labor laws and requirements

b. Affect of labor supply on growth and demand of industry.

c. Training requirements.

1. Professions

2. Skilled

3. Semi-skilled.

4. Unskilled.

3. Necessity of all types of labor.

C. Population and education.

1. School Classifications.

2. School assignment.

D. Population and representation.

a. Classroom.

b. Community.

c. State

d. National

E. Population and food.

1. Source of food supply.

2. Techniques of increasing food supply.

3. Affect of food supply on man's health, culture, birth rate, etc.

PROBLEM AREA IX

THE STUDY OF OUR ARTS

A. Appreciation of our arts.

1. Need for appreciation.

2. Better understanding of.

3. Creativity.

B. Music.

1. Types.

a. Origins.

b. Contributions.

2. Music I like.

3. Musical instruments.

a. Origin.

b. Contributions.

c. Relationships.

4. Composers.

C. Drama.

1. Types.

a. Origin.

b. Contributions.

2. What is good drama? (students opinion)

3. Enjoyment of reading drama.

4. Production of plays.

D. Art and Sculpture.

1. Types.

a. Origin.

b. Contributions.

2. Identification of art and sculpture.

E. Modern dancing.

1. Origin.

2. Contributions.

F. Architecture.

1. Types.

a. Origin.

b. Contributions.

2. Architecture in our community.

G. Arts practiced in our community.

THIS WE CAN EXPECT

The student is expected to achieve through the use of the problem-solving techniques a greater understanding of history, geography, government, and sociology. It can be expected that if the procedure outlined herein is followed the students will better learn to work individually and as a member of a group. Further, it can be expected that the participation in dramatizations, panel discussions, and oral reports will gain for the students a better understanding of the society in which they live.

Realizing that there are a multitude of problem situations in the daily activities of the student this exploratory course was designed to provide the individual an introduction to many broad fields of knowledge.

BIBLIOGRAPHY

A. BOOKS

James, Clifford L., Principles of Economics. New York: Barnes and Noble, Inc., 1954. 567 pp.

Lefler, Hugh T., and Albert Ray Newsome, North Carolina - History, Geography, Government. New York: World Book Company, 1959. 530 pp.

McDaniel, Henry B., Guidance in the Modern School, New York: The Dryden Press, 1956. 526 pp.

Moffatt, Maurice P., Social Studies Instruction. New York: Prentice-Hall, Inc., 1955. 559 pp.

B. UNPUBLISHED MATERIAL

"The Junior High School," Curriculum Bulletin. Winston-Salem City Schools, Winston-Salem, 1959. 120 pp.

THIS WE BELIEVE

The course outline which follows has been written as an eighth grade science curriculum guide to be used in teaching the academically talented student. The science teachers who initiate the use of this outline are encouraged to approach it with the eagerness, anticipation, and objectivity of any scientist launching a new experiment. The outline is not to be considered as a final, rigid framework from which the teacher is not expected to deviate. Revision should be made when it becomes obviously necessary.

It has been anticipated that the physical sciences have been stressed previously, therefore, the emphasis of this outline has been placed on biological science.

THIS WE NEED

In using this outline the teacher should keep in mind the overall objectives of the eighth grade program while working toward their own objectives in science. It is felt that the objectives listed below are paramount in importance to a science program for the academically talented student.

1. To reorganize the existing science curriculum to better meet the needs of potentially outstanding students.
2. To better coordinate the science curriculum at each grade level.
3. To encourage, challenge, and develop to their fullest capacity, so far as possible, the endeavors of these potentially outstanding students.
4. To make the science curriculum one of enrichment going further and deeper into the content of the subject so as to provide the student with greater opportunities for self-development.

PLATE

THE STUDY OF ANIMAL LIFE

Problem Area I - Variety and Unity of Animal Life.
A. Variety of Animal Life.
B. Unity of Animal Life.
C. Animal Habitats.
D. Scientific Classification of Animals.
E. Systems

Problem Area II
Protoplasm and the Cell.
A. Protoplasm.
B. Cells.

Problem Area III
Phylum Protozoa.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area IV
Phylum Porifera.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area V
Phylum Coelenterata.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area VI
Phylum Plathyelminthes.
A. Characteristics.
B. Examples.
C. Systems.
D. Life functions.
E. Economic Importance.

Problem Area VII
Phylum Nemathelminthes.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area VIII - Annelida.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area IX - Phylum Molluska
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area X - Phylum Echinodermata.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions
E. Economic Importance.

Problem Area XI - Phylum Arthropoda.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area XII - Phylum Chordata.
A. Characteristics.
B. Examples.
C. Systems.
D. Life Functions.
E. Economic Importance.

Problem Area XIII - Structure of the Human Body.
A. Specialized Cells of the Human Body
B. Tissues
C. Organs.
D. Systems.

Problem Area XIV - Health and Medicine.
A. Health Heroes and Conquests.
B. Disease.
C. Body Defense Against Disease.
D. Prevention.
E. Alcohol, Narcotics and Tobacco.
F. Radiation Problem.

Problem Area XV - Heredity, Genetics, and Embryology.
A. Basis of Heredity.
B. Principles.
C. Genetics and Human Inheritance.
D. Improvement of Animals and Plants.
E. Development of Living Things.

THE STUDY OF PLANT LIFE

Problem Area XVI - Introduction to Plant Life.
A. Plants and Life.
B. Development of Plant Science.
C. Classification.
D. Morphology and Function.
E. Major Groups of Plants.

Problem Area XVII - Roots, Leaves, and Stems.
A. Roots.
B. Leaves.
C. Stems.

Problem Area XVIII - Plant Reproduction.
A. Asexual Reproduction.
B. Sexual Reproduction.
C. Flower.
D. Chromosomes.
E. Fertilization.
F. Seeds.

Problem Area XX - Heredity.
A. Mendal's Laws.
B. Breeding Methods.
C. Mutations.

Problem Area XXI - Thallophyta.
A. Algae.
B. Fungi.

Problem Area XXII - Bryophyta.
A. Mosses.
B. Liverworts.
C. Hornworts.

Problem Area XXIII - Tracheophyta.
A. Psilophytes.
B. Lycopods.
C. Horsetails.
D. Ferns.
E. Gymnosperms.
F. Angiosperms.

THIS WE CAN DO

THE STUDY OF ANIMAL LIFE

PROBLEM AREA I

VARIETY AND UNITY OF ANIMAL LIFE

A. Variety of animal life.

B. Unity of animal life (common features).

   1. Composition.

   2. Structure.

   3. Form.

   4. Movement.

   5. Metabolism.

   6. Growth.

   7. Reproduction.

C. Animal habitats.

   1. Salt-water animals.

   2. Fresh-water animals.

   3. Terrestrial animals.

   4. Parasitic animals.

D. Scientific classification of animals.

   1. Artificial classification.

   2. Natural classification.

   3. Classification of species.

   4. Origin of modern classification.

E. Systems.

   1. Nervous.

   2. Muscular.

   3. Digestive.

   4. Circulatory.

5. Respiratory.

6. Excretory.

7. Skeletal.

8. Reproductive.

9. Endocrine.

10. Integumentary.

PROBLEM AREA II

PROTOPLASM AND THE CELL

A. Protoplasm.

1. The physical organization of life.

2. The chemical composition of protoplasm.

3. Metabolism.

4. Growth.

B. Cells.

1. Parts of the cell (living and non-living).

2. Use of micro-projector to show simple cells.

3. Cell walls (living and non-living).

a. Chemical aspects....introduction to basic atoms, elements, and compounds.

b. Membranes.

c. Molecular structure.

(1) Organic.

(2) Inorganic.

(3) Ultra-microscopic particles.

4. Osmosis.

a. Physical aspects and principles applicable to the cell.

(1) Solutions, colloids, suspensions.

(2) Electrical effects.

(3) Pressure.

b. Related fields.

5. Energy of the cell.

a. Definition of energy.

b. Measurement of energy.

c. Potential energy.

d. Kinetic energy.

e. Laws of conservation of energy.

f. Decompostion.

g. Synthesis.

6. Zoological aspects of the cell.

a. Single cell animals.

b. Simple reproduction of lower animal forms.

PROBLEM AREA III

PHYLUM PROTOZOA

A. Characteristics.

B. Examples.

1. Amoeba.

2. Paramecium.

3. Euglena.

4. Volvox.

C. Systems.

D. Life Functions.

E. Economic importance.

PROBLEM AREA IV

PHYLUM PORIFERA

A. Characteristics.

B. Examples.

1. Leucosolenia.

2. Scypha.

C. Systems.

D. Life functions.

E. Economic importance.

PROBLEM AREA V

PHYLUM COELENTERATA

A. Characteristics.

B. Examples.

1. Hydra.

2. Medusa.

C. Systems.

D. Life functions.

E. Economic importance.

PROBLEM AREA VI

PHYLUM PLATYHELMINTHES

A. Characteristics.

B. Examples.

1. Planaria.

2. Liver fluke.

C. Systems.

D. Life Functions.

E. Economic importance.

PROBLEM AREA VII

PHYLUM NEMATHELMINTHES

A. Characteristics.

B. Examples.

1. Ascaris Lumbricoides. (Parasitic in man)

2. Vinegar eel.

C. Systems.

D. Life functions.

E. Economic importance.

PROBLEM AREA VIII

PHYLUM ANNELIDA

A. Characteristics.

B. Examples.

1. Lumbricus terrestris. (Earthworm)

2. Neanthes virens. (Sandworm)

C. Life functions.

D. Systems.

E. Economic importance.

PROBLEM AREA IX

PHYLUM MOLLUSKS

A. Characteristics.

B. Examples.

1. Clams.

2. Snails.

C. Life functions.

D. Systems.

E. Economic importance.

PROBLEM AREA X

PHYLUM ECHINODERMATA

A. Characteristics.

B. Examples.

   1. Starfish.

   2. Sea urchins.

C. Life functions.

D. Systems.

E. Economic importance.

PROBLEM AREA XI

PHYLUM ARTHROPODA

A. Characteristics.

B. Examples.

   1. Grasshopper.

   2. Butterfly.

C. Systems.

D. Life functions.

E. Economic importances.

PROBLEM AREA XII

PHYLUM CHORDATA

A. Characteristics of the vertebrates. (Frog)

B. Comparison of vertebrates and invertebrates.

C. Pisces (fish).

D. Amphibia.

E. Reptilia.

F. Mammalia.

PROBLEM AREA XIII

STRUCTURE OF THE HUMAN BODY

A. Specialized cells of the human body.

B. Tissues.

C. Organs.

D. Systems.

1. Skeletal and muscular.

    a. Structure of the skeleton.

    b. Joints.

    c. Muscular system

    d. Application of laws of levers to skeletal structure and movement.

        (1) Levers.

        (2) Other simple machines used to increase force, etc.

    e. Posture.

2. Digestive system.

    a. Phases of digestion.

    b. Need for digestion.

    c. Special organs.

    d. Care of digestive system.

    e. Food

3. Circulatory system.

    a. Types of circulation.

    b. Organs.

    c. Blood.

    d. Care of.

4. Respiration.

    a. Definition.

    b. Organs of respiration.

c. Function.

d. Oxidation within and without the body.

e. Diseases.

5. Excretion.

a. Definition.

b. Organs of excretion.

c. Functions.

6. Nervous system.

a. Definition.

b. Structure of.

c. Functions.

d. Similarity to electrical system.

(1) Properties of current electricity.

(2) Measurement of current electricity.

(3) Communications.

e. Sense organs.

(1) Eye - light and color.

(2) Ear - sound and wave propagating.

(3) Nose.

(4) Skin.

f. Mental hygiene.

g. Endocrine system.

(1) Definition.

(2) Structure.

(3) Function.

h. Reproduction system.

(1) Definition.
(2) Structure.

PROBLEM AREA XIV

HEALTH AND MEDICINE.

A. Health heroes and conquests.

B. Disease.

1. Infectious.

2. Non-infectious.

C. Body defense against disease.

D. Prevention.

E. Alcohol, narcotics and tobacco.

F. Radiation problem.

PROBLEM AREA XV

HEREDITY, GENETICS, AND EMBRYOLOGY

A. Basis of heredity.

B. Principles.

C. Genetics and human inheritance.

D. Improvement of animals and plants.

E. Development of living things.

THE STUDY OF PLANT LIFE

PROBLEM AREA XVI

INTRODUCTION TO PLANT LIFE

A. Plants and life.

1. Life sciences.

2. Importance of plant science.

B. Development of plant science.

1. Plant science of the past.

2. Modern plant science.

C. Classification.

1. Kingdom.

2. Phyla.

3. Class.

4. Order.

5. Family.

6. Genus.

7. Species.

D. Morphology and function.

1. Root.

2. Leaf.

3. Stem.

4. Reproduction.

E. Major groups of plants.

1. Thallophytes.

2. Bryophytes (Moss plants)

3. Tracheophytes (Vascular plants)

PROBLEM AREA XVII

ROOTS, LEAVES, AND STEMS

A. Roots.

1. Root structure.

2. Region of absorption.

3. Diffusion and osmosis.

4. Roots of economic importances.

B. Leaves.

1. Leaf structure.

2. Photosynthesis.

3. Transpiration.

a. Rate.

b. Importance.

4. Leaves of economic importance.

C. Stems.

1. Stem structure.

a. Leaf arrangement

b. Buds.

2. Woody stems.

a. Layers.

b. Cortex.

c. Pith.

d. Cambium.

e. Xylem.

f. Pholem.

g. Endodermis.

h. Pericycle.

3. Herbaceous stems.

4. Monocotyledon stems.

5. Wood structure.

6. Modified stems.

7. Stems of economic importances.

PROBLEM AREA XVIII

ENVIRONMENT OF PLANTS

A. Soil.

1. Composition.

2. Water.

3. Organic matter.

4. Air.

B. Ecology.

1. Response.

2. Stimulus.

3. Temperature.

4. Light. (phototropism)

5. Gravity. (geotropism)

6. Water. (hydrotropism)

7. Chemical. (chemotropism)

C. Plant location.

PROBLEM AREA XIX

PLANT REPRODUCTION

A. Asexual reproduction.

B. Sexual reproduction.

C. Flower.

1. Calyx.

2. Corolla.

3. Stames.

4. Pistils.

D. Chromosomes

1. Mitosis.

2. Meiosis.

E. Fertilization.

F. Seeds.

1. Dispersal.

2. Germination.

PROBLEM AREA XX

HEREDITY

A. Mendal's laws.

1. Genes.

2. Dominance.

3. Segregation.

4. Mendelian ratios.

B. Breeding methods.

1. Hybridization.

2. Inbreeding.

C. Mutations.

PROBLEM AREA XXI

THALLOPHYTA

A. Algae.

1. Blue-green algae.

2. Green algae.

3. Brown algae.

4. Red algae

B. Fungi.

1. Bacteria.

2. Viruses.

3. Slime fungi.

4. Lichens.

PROBLEM AREA XXII

BRYOPHYTA

A. Mosses.

B. Liverworts.

C. Hornworts.

PROBLEM AREA XXIII

TRACHEOPHYTA

A. Psilophytes.

B. Lycopods.

C. Horsetails.

D. Ferns.

E. Gymnosperms.

F. Angiosperms.

THIS WE CAN EXPECT

We can expect from this program that the academically talented student will gain a better understanding of the world in which he lives. We can expect the student to develop to his fullest capacity in a worthwhile endeavor. Further we can expect this program to provide for the student opportunities for better self-development.

BIBLIOGRAPHY

A. BOOKS

Hegner, Robert W., and Karl A. Stiles, College Zoology. New York: The Macmillan Company, 1957. 911 pp.

Sinnott, Edmund W., and Katherine S. Wilson, Botany: Principles and Problems. New York: McGraw-Hill Book Company, Inc., 1955. 528 pp.

Weisz, Paul B., Biology. New York: McGraw-Hill Book Company, Inc., 1954. 676 pp.

Wilson, Carl L., and Walter E. Loomis, Botany. New York: The Dryden Press, 1958. 528 pp.

B. UNPUBLISHED MATERIAL

"Guide for Science 9-D," Curriculum Bulletin No. 60. Saint Paul Public Schools, Saint Paul, 1957. 50 pp.

THIS WE BELIEVE

The primary purpose behind this guide is to provide teachers with a helpful instructional tool for presenting an enriched program of algebra to eighth grade pupils possessing outstanding potentials in this field.

This program of study has been organized around a sequence of units that is generally considered standard for a course in elementary algebra. This course, however, differs from a basic course in algebra in two important aspects. Upon examination the instructor will first find that increased emphasis has been recommended in connection with associative skills of algebra. Second the instructor will find departure from a basic course in algebra is in the area of enrichment. To help the pupil gain a fuller appreciation for the subject than is normally realized, the standard organization of this program has been interwoven with a variety of enrichment topics.

THIS WE NEED

The objective of this guide is to provide for the mathematics teacher a program which will operate to help each pupil meet his needs for training in mathematics. The framework of this guide has been planned to provide opportunities for experiences beyond those offered to a normal eighth grade class so that each pupil will:

1. Develop an attitude for critical thinking.
2. Obtain worthwhile insights into algebraic concepts and processes.
3. Gain an appreciation for the importance of making careful definitions, making assumptions, and constructional proofs.
4. Obtain an understanding of the role of mathematics in our culture.

It should be remembered that the school, in order to provide real depth of understanding for the pupil, should provide a program which will offer experiences and instructions which are in keeping with that individual's capabilities.

PLATE

Problem Area I
The Language of Algebra
- A. General Numbers.
- B. Re-introducing the Formula.
- C. Vocabulary.
- D. Writing and Understanding Algebraic Expressions.
- E. Evaluation of Algebraic Expressions.
- F. Writing of Algebraic Formulas.
- G. Use of Formulas to Solve Problems.

Problem Area II
Equations
- A. Developing and Understanding of the Simple Equation.
- B. Finding the Solution to an Equation.
- C. Understanding the Use of Addition, Subtraction, Multiplication, and Division in Equations.

Problem Area III
Signed Numbers
- A. Understanding the Use of Signed Numbers.
- B. Mathematical Basis for the Origin of Signed Numbers.
- C. Locating Positive and Negative Numbers on a Horizontal Number Scale.
- D. The Absolute Value of Positive and Negative Numbers.
- E. Fundamental Operations with Directed Numbers.

Problem Area IV
Monomial and Polynomial Quantities.
- A. Definitions of Monomials and Polynomials.
- B. Addition and Subtraction of Monomials.
- C. Multiplication and Division of Monomials.
- D. Scientific or Standard Number Notation.
- E. Addition and Subtraction of Polynomials.
- F. Distributive Law of Multiplication Relative to Addition.

Problem Area V
Graphs
- A. Definition of Graph.
- B. Review All Previous Work on Graphs.
- C. Graphs and Tables of Conversion.

Problem Area VI
Mathematical Relations
- A. Definition of Set.
- B. Set of Number Pairs.
- C. Set of Number Pairs and a Rule Which Indicates How the Elements of Two Primary Sets are Paired.
- D. Variables.
- E. Definition of Mathematical Relation.
- F. Mathematical Relation and Functional Relation.
- G. Independent and Dependent Functions.

Problem Area VII
Representation by Graphs
- A. Approaching Graphs from a Practical Standpoint.
- B. Graphing First Degree Equations in Two Unknowns.

Problem Area VIII
First Degree Equations in Two Unknowns
- A. Solving an Equation of the Form ax - by - c.
- B. Two First Degree Equations in Two Unknowns.
- C. Relation of Two First Degree Equations and Their Graphs.
- D. Solving a Set of Equations in Two Unknowns.
- E. Using Systems of Equations to Solve Practical Problems.
- F. Solving Equations Having Literal Coefficients.

Problem Area IX
Special Products and Factoring
- A. Special Products.
- B. Factoring.
- C. Solving Quadratic Equations by Factoring.

Problem Area X
Use of Fractions
- A. The Why of Fractions.
- B. Operations Permissible on Fractions
- C. Define Equivalent Fraction.
- D. Define Transforming of a Fraction.
- E. Multiplication of Fractions.
- F. Division of Fractions.
- G. Addition and Subtraction of Fractions.
- H. Signed Fractions.
- I. Working With Complex Fractions.

Problem Area XI
Fractions and Equations
- A. Define Equivalent Equations.
- B. Elimination of Fractions in Solving Equations.
- C. Apparent Solutions.
- D. Practice With One and Two Unknowns.

Problem Area XII
Ratio, Proportions, and Variations.
- A. Shadow Measurements.
- B. Practical Uses of Comparisons.
- C. Ratio.
- D. Proportions.
- E. Variations.

Problem Area XIII
Roots, Radicals, and Exponents.
- A. Methods of Finding Square Roots.
- B. Cube Roots and Roots of Higher Order.
- C. Rational and Irrational Numbers.
- D. Review of "The Number System".
- E. Simplifying Radicals and Expressions Containing Radicals.
- F. Fractional, Negative, and Zero Exponents.

Problem Area XIV
Quadratic Equations
- A. Define Quadratic Equation.
- B. Solving Quadratic Equations by Completing the Square.
- C. The Quadratic Equation.
- D. Quadratic Equations in Two Unknowns.

Problem Area XV
Measurement and Trigonometric Ratio (Optional)
- A. Background Material Geometry.
- B. Direct Measurements.
- C. Indirect Measurements.

THIS WE CAN DO

Recognizing that certain limitations would affect the ultimate success of the mathematics program, it must be assumed that the course possess built-in flexibility with respect to (a) various administrative provisions, and (b) the use of instructional materials and techniques.

Problem Area I
THE LANGUAGE OF ALGEBRA

A. General numbers.
   1. The practice of using letters as numbers.
   2. Definitions.

B. Re-introducing the formula.
   1. Review of previous experience with formula.
   2. Using a formula to translate a rule.

C. Vocabulary.
   1. Algebraic expressions.
   2. Terms.
   3. Factors.
   4. Exponents.
   5. Base.
   6. Power.
   7. Co-efficient.

D. Writing and understanding algebraic expressions.
   1. Translating verbal phrases and sentences into symbols.
   2. Practice of translating symbols into oral statements to insure understanding.
   3. Individual practice skills should be conducted to meet student needs.

E. Evaluation of algebraic expressions.

1. Definitions.

    a. Substitution.

    b. Evaluation.

2. Parenthesis.

    a. Use of terms within the parenthesis.

    b. The relation of one set of parenthesis with others in the same problem.

    c. Order of operations.

F. Writing of algebraic formulas.

1. The understanding and use of verbal statements changed into formulas.

2. An understanding of tables and how to write a formula which states the rules suggested by the tables.

G. Use of formulas to solve problems.

1. Students should follow orderly methods.

    a. Understanding and writing formula which applies to the problem.

    b. Performing the operations contained in the formula.

    c. Writing the answers in the correct units.

2. Provide practice with problems which require the use of formulas involving:

    a. Plane geometry.

    b. Solid geometry.

    c. Time payments.

    d. Interest.

    e. Commissions.

    f. Home economics.

    g. Others.

Problem Area II

EQUATIONS

A. Developing and understanding of the simple equation.

   1. Writing equations from written problems.

   2. Realizing the balance envolved in an equation.

B. Finding the solution to an equation.

   1. Understanding the "unknown".

   2. Realization that the solution is a value.

   3. Practice and use of different methods in solving equations.

   4. Checking system in solving equations.

C. Understanding the use of addition, subtraction, multiplication, and division in equations.

   1. The understanding of inverse operations with regards to addition and subtraction, multiplication and division in equations.

   2. Show that it is not possible to divide by zero.

Problem Area III

SIGNED NUMBERS

A. Understanding the use of signed numbers.

B. Mathematical basis for the origin of signed numbers.

   1. Positive numbers.

      a. Integers.

      b. Fractions.

      c. Mixed numbers.

   2. Zero.

   3. Negative numbers.

C. Locating positive and negative numbers on a horizontal number scale.

D. The absolute value of positive and negative numbers.

   1. Absolute value - its meaning in relation to zero.

2. Signs indicate the direction the operations take.

E. Fundamental operations with directed numbers.

1. Rules of operation.

a. Have students discover the rules of operation.

b. Direct pupils attention to the three meanings of the plus and minus signs.

(1) Each sign is used to identify a numbers position in the scale of numbers.

(2) Each sign is a sign of direction.

(3) Both signs are signs of operation.

2. Commutative and associative laws for addition and multiplication.

3. Solving equations that may yield both positive and negative roots.

Problem Area IV

MONOMIAL AND POLYNOMIAL QUANTITIES

A. Definitions of monomials and polynomials.

B. Addition and subtraction of monomials.

C. Multiplication and division of monomials.

1. Rules of exponents.

2. Exponents used with constants.

D. Scientific or standard number notation.

1. Concept of significant numbers.

2. Individual practice with scientific numbers.

E. Addition and Subtraction of polynomials.

1. Give attention to decimal system, and significance to like terms when performing these operations.

2. Show pupils why it is permissible to proceed from left to right in working exercises in algebra.

F. Distributive law of multiplication relative to addition.

1. Removing and enclosing parenthesis.

2. Solving equations with parenthesis.

G. Multiplication and division of polynomials.

1. Multiplying polynomial by monomial.

2. Multiplying polynomial by polynomial.

3. Dividing polynomial by polynomial.

a. Check by multiplication.

b. Write remainders so that pupils understand
$6 - 4 = 1\ 1/2$ (1 and 1/2 or 1 - 1/2)

Problem Area V

GRAPHS

A. Definition of graph. Suggested procedure would be to have pupils make a list of words containing the suffix "graph".

B. Review all previous work on graphs.

1. Practice reading graphs.

2. Point out the fallacy of "false reading into graphs".

C. Graphs and tables of conversion. Extensive work in this area will help in later units.

Problem Area VI

MATHEMATICAL RELATIONS

A. Definition of set. A set is a collection of things.

B. Set of number pairs.

1. Pupils are often familiar with number pairs appearing in daily use.

2. Pupils are not aware of the mathematical relation connected with these number pairs.

C. Set of number pairs and a rule which indicates how the elements of two primary sets are paired.

1. Represent primary sets with capital letters, i.e., A, B, X, Y and arbitrary elements of these sets with small letters, i.e., a, b, x, y.

2. Represent number pairs in the form (x,y).

3. A formula may be used for pairing numbers.

D. Variables - A general number for which constant values may be substituted.

   1. Review previous material where this definition applies.

   2. Incorrect in mathematics to say that "a variable is a quantity that varies".

E. Definition of a mathematical relation.

F. Mathematical relation and functional relation.

   1. Define a function mathematically.

   2. All functions are mathematical relations but not all mathematical relations are functions.

   3. Explain graphically the decision on whether a relation is a function.

   4. Give individual assignments so that students can become familiar with graphs.

   5. Constant functions.

G. Independent and dependent functions.

Problem Area VII

REPRESENTATION BY GRAPHS

A. Approaching graphs from a practical standpoint.

   1. Rectangular of Cartesian system of coordinates.

   2. Give verbal practice with terms such as:

      a. X-axis.

      b. y-axis.

      c. abscissa.

      d. ordinate.

B. Graphing first degree equations in two unknowns.

   1. Slope.

   2. Transforming a first degree equation.

   3. Graphing by slope.

   4. Graphing with equations containing a constant.

   5. Graphing by locating intercepts.

Problem Area VIII

FIRST DEGREE EQUATIONS IN TWO UNKNOWNS

A. Solving an equation of the form $ax + by = c$ when a, b, and c are constants.

   1. Define solution of such an equation.

   2. Point out infinite number of possible solutions for such an equation.

B. Two first degree equations in two unknowns.

   1. Define common solution.

   2. Define such expressions as "set of equations", "pair of equations", and "system of equations".

C. Relation of two first degree equations and their graphs.

   1. Independent and dependent equations.

   2. Inconsistent and consistent equations.

D. Solving a set of equations in two unknowns.

   1. Graphing.

   2. Eliminating by subtraction and addition.

   3. Eliminating by subetitution.

E. Using systems of equations to solve practical problems.

F. Solving equations having literal coefficients.

Problem Area IX

SPECIAL PRODUCTS AND FACTORING

A. Special products.

   1. Introduction.

      a. Review the definition of product.

      b. Use arithmetic illustrations to emphasize the meaning of special products.

      c. Emphasize that most products produced in arithmetic are not special products.

      d. Introduce the process of factoring as the inverse of multiplying.

e. Help the students realize that they should not try to extract hard and fast rules.

f. Point out that the trial and error method is acceptable.

2. Products of monomial and polynomial.

3. Products of two binomials.

a. Product of two binomials that have pairs of like terms.

b. Product of the sum and difference of pairs of monomials.

c. Square of a binomial.

4. Squares and square roots.

a. Definition of a square.

b. Definition of the perfect square.

(1) Relate the fact that the term perfect square has semantic significance.

(2) Point out the term perfect square is frequently applied to any square.

c. Perfect square trinomials.

B. Factoring.

1. Polynomials whose terms have a common monomial factor.

2. Difference of two squares.

a. Geometrical illustrations.

b. Using the difference of two squares to solve certain area problems.

c. Solving problems envolving the Pythagorean relation.

d. Another illustration that division by zero is meaningless.

3. Factoring perfect square trinomials.

a. Prime factors.

b. Factoring completely.

c. Application of the conventional process of factoring completely.

C. Solving quadratic equations by factoring.

1. Reviewing operations envolving zero.

2. Associative skills of interpretation for the process of "solving a quadratic equation by factoring."

3. Using factoring to solve first and second degree equations.

Problem Area X

USE OF FRACTIONS

A. The why of fractions. Need illustrated by the example $3 - 5 = ?$

B. Operations permissible on fractions.

C. Define equivalent fraction.

D. Define transforming of a fraction.

E. Multiplication of fractions.

F. Division of fractions.

1. Reciprocal of fractions.

2. Define reciprocal or inverse.

G. Addition and subtraction of fractions.

1. Relate the operation of combining fractions having same denominator with practical things such as money, animals, etc.

2. Define common denominator.

H. Signed fractions.

I. Working with complex fractions.

Problem Area XI

FRACTIONS AND EQUATIONS

A. Define equivalent equations.

B. Elimination of fractions in solving equations.

C. Apparent solutions (roots).

D. Practice with one and two unknowns.

Problem Area XII

RATIO, PROPORTIONS, AND VARIATIONS

A. Shadow measurements.

B. Practical uses of comparisons.

C. Ratio.

   1. Define ratio.

   2. Methods employed in writing ratios.

D. Proportion.

   1. Proof of proportions.

   2. Solving proportion problems.

   3. Direct and indirect proportions.

E. Variations.

   1. Direct and indirect variations.

   2. Other variations.

Problem Area XIII

ROOTS, RADICALS, AND EXPONENTS

A. Methods of finding square roots.

   1. Use of table.

   2. Successive approximation.

   3. Averaging.

   4. By algorithm (sometimes called the arithmetic method).

B. Cube roots and roots of higher order. Define cube root.

C. Rational and Irrational numbers.

   1. Rational numbers.

      a. Definition.

      b. Intsgers, common fractions, mixed numbers, terminating decimals.

      c. Repeating decimals are rational numbers.

   2. Irrational numbers.

a. Definition.

b. Use and understanding of irrational numbers.

D. Review of "The Number System".

1. Outline of "The Number System".

2. Locating all numbers of "The Number System" on a numbers scale.

3. Construction and use of other base systems.

E. Simplifying radicals and expressions containing radicals.

1. Factoring under the radical sign and removing perfect square factors.

2. Simplifying radicals containing fractions by rationalizing denominators.

3. Multiplying under the radical sign when the radicals involved have the same index.

4. Combining like radicals by addition and subtraction.

5. Solving and checking equations involving radicals.

F. Fractional, negative, and zero exponents.

Problem Area XIV
QUADRATIC EQUATIONS

A. Define a quadratic equation.

1. Galileo's law of falling bodies.

2. First and second degree equations.

3. Factoring quadratic equations.

B. Solving quadratic equations by completing the square.

1. Perfect square trinominal.

2. Individual practice in completing the square.

3. Completing the square geometrically.

D. The quadratic equation.

E. Quadratic equations in two unknowns.

1. Solution of quadratic equations in two unknowns.

2. Graphing a quadratic equation.

3. Solving a quadratic equation by graphs.

Problem Area XV
MEASUREMENT AND TRIGONOMETRIC RATIO (OPTIONAL)

A. Background material in geometry.

1. Plane figures.

2. Similar, equal, and congruent triangles.

B. Direct measurements.

1. Approximate measurements.

2. Precision of measurements.

3. Accuracy of measurements.

C. Indirect measurements.

1. Shadow measurements.

2. Scale drawing.

D. Trigonometric ratios.

1. Define sine, cosine, and tangent ratios.

2. Practice in use of sine, cosine and tangent ratios.

3. Use of tables.

THIS WE CAN EXPECT

We can expect the students who are challenged by this elementary course in algebra to develop an attitude for critical thinking, to gain an overall view of the importance of algebra- as a field of mathematics - and gain an appreciation for the importance of this subject. Further, we can expect the students to gain an understanding of the importance that algebra plays in our culture.

BIBLIOGRAPHY

A. BOOKS

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, New Knowing About Numbers. Philadelphia: John C. Winston Company, 1959. 394 pp.

Hart, Walter W., A First Course in Algebra. Boston: D. C. Heath and Company, 1951. 389 pp.

_____, A Second Course in Algebra. Boston: D. C. Heath and Company, 1951. 488 pp.

B. UNPUBLISHED MATERIAL

"Guide for Instruction in Mathematics 9-D." Curriculum Bulletin No. 61. St. Paul Public Schools, Saint Paul, 1957, 68 pp.

LANGUAGE ARTS

In the summer of 1960 at Western Carolina College an intensive workshop was held on the gifted child. Nine guides for gifted children were produced. An extensive guide for the LANGUAGE ARTS is included in volume eight and the reader should refer to that volume for material pertaining to the Language Arts program for grade eight.